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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/712,712

11/14/2003

Takeshi Sato

HITA.0458

9287

38327

7590

05/04/2005

REED SMITH LLP

3110 FAIRVIEW PARK DRIVE, SUITE 1400

FALLS CHURCH, VA 22042

EXAMINER

BOOTH, RICHARD A

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/712,712

Applicant(s)

SATO ET AL.

Examiner

Olivia T. Luk

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 and 22 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-9 and 11 is/are rejected.
- 7) ☒ Claim(s) 4 and 10 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

ALEXANDER GHYKA
PRIMARY EXAMINER

Av 2812
[Signature]

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/14/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 11/14/03 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 and 5-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jyumonji et al. (6,870,126 B2).

In re claim 1, Jyumonji et al. discloses a laser beam is repeatedly exposed to a semiconductor film formed on a dielectric substrate of an active matrix substrate to produce a polycrystallized semiconductor film, comprising : intensity modulating said laser beam 3 (col. 12, lines 33-35); and directing and shaping said laser beam to be periodic in at least one direction (col. 11, lines 5-14), but fails to teach moving randomly the intensity distribution of the laser beam on said semiconductor film in the periodic direction of said intensity modulation.

However, Jyumonji et al. teach moving the intensity distribution of the laser beam on the semiconductor film in the periodic direction of the intensity modulation (col. 11, lines 35-55), which may be applied randomly.

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It would have been obvious to one having ordinary skill in the art the time the invention was made to have had the intensity distribution of the laser beam move randomly in the periodic direction of the intensity modulation as all other conditions in the prior art existed and it would only have taken ordinary skill in the art to have moved with randomness rather than follow the program.

In re claim 2, Jyumonji et al. discloses moving the laser beam relatively in a given direction with respect to said dielectric substrate at a constant velocity to expose said semiconductor film a plurality of times to crystallize said semiconductor film (col. 10, lines 36-49), and wherein said laser beam is a pulsed laser beam (col. 10, line 41); and moving an exposure position of said laser beam to said semiconductor film from one exposure position to another exposure position a plurality of times for a laser beam exposure, in a direction perpendicular to said moving direction to crystallize said semiconductor film (see the z-axis; col. 7, lines 10-20 and col. 17, lines 10-14, 52-65), but fails to teach moving randomly the intensity distribution of the laser beam on said semiconductor film in the periodic direction of said intensity modulation.

However, Jyumonji et al. teach moving the intensity distribution of the laser beam on the semiconductor film in the periodic direction of the intensity modulation (col. 11, lines 35-55), which may be applied randomly.

It would have been obvious to one having ordinary skill in the art the time the invention was made to have had the intensity distribution of the laser beam move randomly in the periodic direction of the intensity modulation as all other conditions in the prior art existed and it would

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only have taken ordinary skill in the art to have moved with randomness rather than follow the program.

In re claims 3 and 9, Jyumonji et al. discloses a coordinate y on said semiconductor film in the periodic direction of said intensity modulation at the point where the laser beam intensity becomes a minimum at the time of said laser beam exposure, may be given by $y = na + r$ where a designates a periodicity of intensity modulation of said laser beam, n designates an integer, r designates a non-negative value smaller than a and which is determined for each exposure, and in which the difference between the maximum and minimum values of said r is a half or more of periodicity (col. 19, lines 40-67 and see Figure 16B).

In re claims 5 and 11, Jyumonji et al. discloses forming, in a periodic direction of the intensity modulation of said laser beam, a polycrystalline semiconductor film having grain size approximately equivalent to said periodic direction (col. 22, lines 25-30).

In re claim 6, Jyumonji et al. discloses providing a long axis and a short axis of exposure shape on said semiconductor film to said laser beam and providing a rectangular form laser beam

having a periodic intensity modulation in said long axis direction; moving said laser beam in relation to said dielectric substrate in said short axis direction of said laser beam to said semiconductor film for exposing said semiconductor film a plurality of times to crystallize said semiconductor film; (col. 17, lines 10-20) and moving the intensity modulation of said laser beam on the semiconductor film formed on said dielectric substrate from one laser beam exposure position to another laser beam exposure position in said long axis direction (col. 17, lines 43-50), but fails to teach moving randomly the intensity distribution of the laser beam on said semiconductor film in the periodic direction of said intensity modulation.

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However, Jyumonji et al. teach moving the intensity distribution of the laser beam on the semiconductor film in the periodic direction of the intensity modulation (col. 11, lines 35-55), which may be applied randomly.

It would have been obvious to one having ordinary skill in the art the time the invention was made to have had the intensity distribution of the laser beam move randomly in the periodic direction of the intensity modulation as all other conditions in the prior art existed and it would only have taken ordinary skill in the art to have moved with randomness rather than follow the program.

In re claim 7, Jyumonji et al. discloses changing the intensity modulation of said laser beam on said semiconductor film from one laser beam exposure position to another laser beam exposure position, except for the displacement distance moved in said short axis (col. 17, lines 10-20; col. 18, lines 59-67), but fails to teach moving randomly the intensity distribution of the laser beam on said semiconductor film in the periodic direction of said intensity modulation.

However, Jyumonji et al. teach moving the intensity distribution of the laser beam on the semiconductor film in the periodic direction of the intensity modulation (col. 11, lines 35-55), which may be applied randomly.

It would have been obvious to one having ordinary skill in the art the time the invention was made to have had the intensity distribution of the laser beam move randomly in the periodic direction of the intensity modulation as all other conditions in the prior art existed and it would only have taken ordinary skill in the art to have moved with randomness rather than follow the program.

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In re claim 8, Jyumonji et al. discloses using a phase shift mask 31 having a periodicity of the periodicity of said intensity modulation times an integer more than two to maintain a constant distance between said semiconductor film and said phase shift mask to provide periodic intensity modulation of said laser beam (col. 11, lines 5-25, 36-50).

Allowable Subject Matter

4. Claims 4, 10, and 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In re claims 4 and 10, prior art of record fails to teach melting an area smaller than a crystal grain on the crystallized semiconductor film and promoting crystallization around the cores of plural crystal grains thus divided to reconstruct a single crystal grain.

In re claim 12-14, prior art of record fails to teach or reasonably suggest exposing the semiconductor film to a second modulated pulsed laser beam having a periodicity smaller than the first periodicity.

5. Claims 21 and 22 are allowed.

Prior art of record fails to teach melting an area smaller than a crystal grain on the crystallized semiconductor film and promoting crystallization around the cores of plural crystal grains thus divided to reconstruct a single crystal grain.

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Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References not applied are considered state of the art in the area of semiconductor manufacture.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Olivia T. Luk whose telephone number is 571-272-1676. The examiner can normally be reached on 8AM to 5PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

OTL
April 19, 2005

ALEXANDER GHYKA
PRIMARY EXAMINER

AV 2812
